

# REAL-TIME RIVER WATER QUALITY MONITORING AND CONTROL SYSTEM

## INTRODUCTION:

The environment around consists of five key elements e.g., soil, water, climate, natural vegetation, and landforms. Among these water is the utmost crucial element for human life. It is also vital for the persistence of other living habitats. Whether it is used for drinking, domestic use, and food production or recreational purposes, safe and readily available water is the need for public health. So it is highly imperative for us to maintain water quality balance. Otherwise, it would severely damage the health of the humans and at the same time affect the ecological balance among other species. Water pollution is a foremost global problem which needs ongoing evaluation and adaptation of water resource directorial principle at the levels of international down to individual wells. It has been studied that water pollution is the leading cause of mortalities and diseases worldwide.

Internet of things (IoT) is an innovative technological phenomenon. It is shaping today's world and is used in different fields for collecting, monitoring and analysis of data from remote locations. IoT integrated network is everywhere starting from smart cities, smart power grids, and smart supply chain to smart wearable. Though IoT is still under applied in the field of environment it has huge potential. It can be applied to detect forest fire and early earthquake, reduce air pollution, monitor snow level, prevent landslide, and avalanche etc. Moreover, it can be implemented in the field of water quality monitoring and controlling system.

## EXISTING SYSTEM:

Now a day's water is polluted due to many reasons. In this current system, the equipment cost is high, and it takes a lot of time to process. Traditional methods have the drawbacks such as long waiting time for results high cost, low measurement precision, and complicated methodology. So with the implementation in the technology, we use different methods and techniques to check the quality of water. There is a disadvantage in the existing system that the system has high complexity and low performance.

## PROPOSED SYSTEM:

The main aim is to develop a system for continuous monitoring of river water quality at remote places using wireless sensor networks with low power consumption, low-cost and high detection accuracy. pH, conductivity, turbidity level, etc. are the limits that are analyzed to improve the water quality. Following are the aims of idea implementation

- (a) To measure water parameters such as pH, dissolved oxygen, turbidity, conductivity, etc. using available sensors at a remote place.
- (b) To assemble data from various sensor nodes and send it to the base station by the wireless channel.
- (c) To simulate and evaluate quality parameters for quality control.

(d) To send SMS to an authorized person routinely when water quality detected does not match the preset standards, so that, necessary actions can be taken.

## **TOP FIVE HARDWARE COMPONENTS OF A SMART WATER QUALITY MONITORING SYSTEM**

The hardware utilized in an IoT ecosystem includes servers, a routing device, IoT sensors, and others that manage essential functions such as system activation, security communication, action specifications, and detection to support specific goals and actions.

### **1. Ultrasonic sensor**

As the name suggests, the sensor generates a high-frequency sound wave of 40 kHz to send and receive ultrasonic pulses that relay back information about an object's proximity. This hardware provides a 2 cm to 4 cm measurement range and comes with an ultrasonic transmitter (trigger pin), receiver (echo pin), and a control circuit.

### **2. pH sensor**

The sensor measures the amount of alkalinity and acidity in water and other metrics. When used correctly, the smart solutions can measure the safety and quality of the product and the processes occurring at a wastewater or manufacturing plant. It has an electrode of measurement and reference. With every increase in pH values, the concentration of hydrogen ions decreases ten-fold, reducing the intensity of acidic water.

### **3. Digital thermometer sensor**

It is commonly used to measure the temperature and humidity values of the surrounding atmosphere. It comes with an 8-bit microscope and a Negative Temperature Coefficient (NTC) tool for measurements. With the thermometer, one can determine the types of marine organisms that can survive in the current state of water.

### **4. Turbidity sensor**

The sensor helps calculate the quality of clear water, i.e., the number of particles in water. It utilizes light to identify whether the water is opaque or murky by transmitting light beams. Excess turbidity can reduce marine life and reproduction and cause various forms of human illness. The sensor generates both analog and digital mode output.

### **5. RF module**

Short for radio-frequency, the module is a small electronic device that transmits and/or receives radio signals between two devices. An embedded IoT-based cost-effective and efficient system comes in handy to initiate communication between two smart sensors.

## **SOFTWARE DESIGN:**

The proposed water quality monitoring system based on WSN can be divided into three parts:

- IoT platform
- Neural network models in Big Data Analytics and water quality management
- Real-time monitoring of water quality by using IoT integrated Big Data Analytics

1. Connect to the access point using id and password through mobile phone or computer.
2. The controller is then connected to the access point using Wi-Fi.
3. Login to cloud platform, where a token is generated
4. Use the token id in the program.
5. Data from the controller are loaded into the cloud.
6. Data can be viewed on the cloud platform.

## **CONCLUSIONS AND FUTURE WORKS:**

Real-time monitoring of water quality by using IoT integrated Big Data Analytics will immensely help people to become conscious against using contaminated water as well as to stop polluting the water. The research is conducted focusing on monitoring river water quality in real-time. Therefore, IoT integrated big data analytics is appeared to be a better solution as reliability, scalability, speed, and persistence can be provided. During the project development phase an intense comparative analysis of real-time analytics technologies such as Spark streaming analysis through Spark MLlib, Deep learning neural network models, and Belief Rule Based (BRB) system will be conducted. This research would recommend conducting systematic experimentation of the proposed technologies in diverse qualities of river water in Bangladesh.

Due to the limitation of the budget, we only focus on measuring the quality of river water parameters. This project can be extended into an efficient water management system of a local area. Moreover, other parameters which wasn't the scope of this project such as total dissolved solid, chemical oxygen demand and dissolved oxygen can also be quantified. So the additional budget is required for further improvement of the overall system.